Minnewawa Brook
New Hampshire

Howe Reservoir Dam Dam-Break Flood Delineations

July 1990

US Army Corps of Engineers
New England Division

HOWE RESERVOIR DAM
DAM-BREAK FLOOD ANALYSIS

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1. PURPOSE AND SCOPE

This report is a continuation of a dam-break flood analysis, on the Howe Reservoir Dam, completed by the U.S. Army Corps of Engineers, dated March, 1986. The study's objective is to delineate and quantify the extent of the probable inundation flood area in the event of a dam-break failure, so that such information is available for use in emergency planning. This study was not performed because of any known likelihood of a dam-break at Howe Reservoir Dam. The dam is located in Harrisville, New Hamphsire, on the stream which flows from Howe Reservoir to Russell Reservoir. It is owned, operated and maintained by the Water Resources Board of New Hampshire. This study is limited to the accuracy of five-foot-contour mapping.

Delineations were continued downstream to a point at which the inundation from a dam-break approximates that of a one-hundred year storm event. The limits of this study are shown in Plate 3.

2. AUTHORITY

Authority for U.S. Army Corps of Engineers participation in this effort is sanctioned by Section 206 of the 1960 Flood Control Act (Public Law 86-645) which states:

> "... The Secretary of the Army, through the Chief of Engineers, Department of the Army, is hereby authorized to compile and disseminate information on floods and flood damages, including identification of areas subject to inundation by floods of various magnitudes and frequencies, and general criteria for guidance in the use of floodplain areas and to provide engineering advice to local interests for their use in planning to ameliorate the flood hazard..."

3. DAM DESCRIPTION

Identification No.	NH00095
Name of Dam:	Howe Reservoir Dam
Town:	Harrisville
County and State:	Cheshire County, New Hampshire
Stream:	Tributary of Minnewawa Brook

Howe Reservoir Dam is located in the southwestern part of the state of New Hampshire. It is located on the northern tip of the reservoir, about one mile upstream from the village of Chesham, and eight miles east of Keene, New Hampshire (Plate 1). The stream flow from Howe Reservoir flows into Russell Reservoir in Chesham, and from there to Minnewawa Brook in Marlborough, which is a tributary to the Ashuelot and Connecticut Rivers. Howe Reservoir is surrounded by woods on all sides. The dam consists of dry rubble masonry, capped

with concrete, and an earth fill embankment with a total height of approximately 157 feet and a maximum height of approximately 28 feet above the streambed. The maximum storage is 2,086 acre-feet. The portion of the dam consisting of dry rubble masonry has a vertical incline downstream face, and an upstream face inclined about 45 degrees with a six inch reinforced concrete slablaid over the upstream face. On the upstream side, a cutoff trench was excavated to bedrock at the heel of the dam and filled with concrete. The top width of the masonry dam is 3.5 feet and the earth embankment is more than 20 feet wide. The spillway is located in the southern portion of the dam with a crest elevation of 1274.5 feet NGVD. The concrete crest is approximately one foot wide and 75 feet long.

4. PERTINENT DATA

Data is taken from "Phase I Inspection Report" for Howe Reservoir Dam, dated May, 1979.

a. Drainage Area Howe Reservoir, which is man made, is located at a distance of eight miles east of Keene, New Hampshire. The watershed is heavily wooded, undulated and rolling with a total drainage area of 10.5 square miles.

b. Elevation (feet NGVD)

(1) Top of Dam:	1276.5
(2) Spillway crest:	1274.5
(6) Maximum tailwater:	Unknown

c. Reservoir (miles)

(1) Length of normal pool:	1.4

d. Storage (acre-feet)

(1) Top of dam:	2086
(2) Spillway crest:	1610

e. Reservoir Surface (acres)

(1) Top of dam:	268
(2) Spillway crest:	208

f. Dam

(1) Type:	Dry rubble masonry and earth fill
(2) Length:	157 ft.
(3) Height:	28.5 ft.
(4) Top width:	minimum 3.5 ft.

(5) Side slopes:
  a. Dry Rubble Masonry
    1. upstream - 1 vertical to 1 horizontal
    2. downstream - vertical
  b. Rolled Earth Fill
    1. upstream - flatter than 1 vertical to 2 horizontal
    2. downstream - 1 vertical to 1.5 horizontal

(6) Zoning: not applicable

(7) Impervious core: none

(8) Cutoff: Heel - dry rubble masonry
Center - earth fill

(9) Grout curtain: none

g. Spillway

(1) Type: Ungated concrete weir.

(2) Length of weir: 75 ft.

(3) Crest elevation: 1274.5 ft.

(4) Gates none

(5) U/S channel: Reservoir

h. Regulating Outlet

(1) Invert: 1267.0 ft. NGVD

(2) Size: 12 feet wide; 9.5 feet deep; 15 feet long

(3) Description: reinforced concrete channel

(4) Control Mechanism: stop logs

(5) Other
  (a) Description: 36 inch steel conduit
  (b) Invert: 1259.0
  (c) Control Mechanism: 42 inch gate operated manually

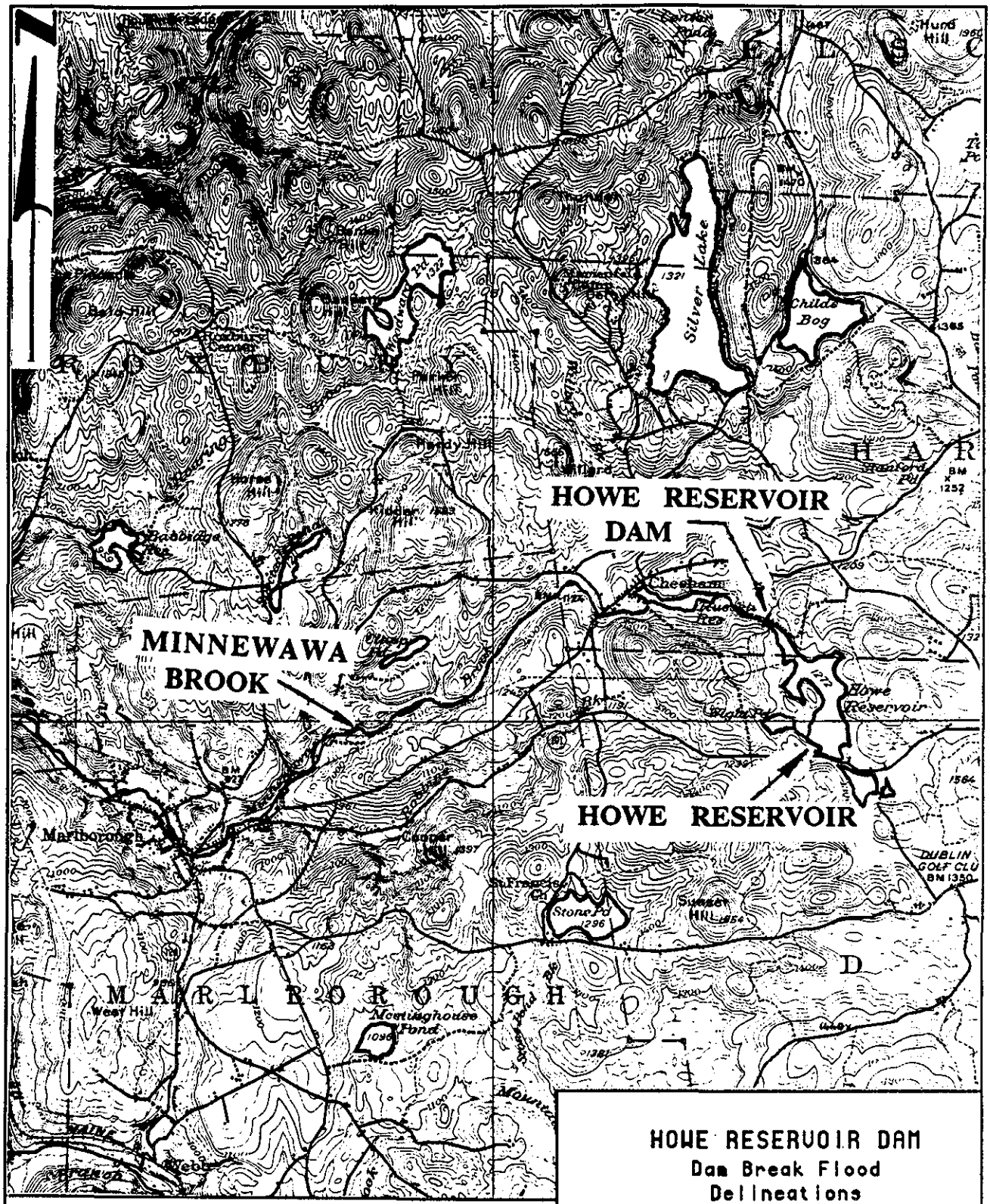
5. DOWNSTREAM COMMUNITY INFORMATION

Howe Reservoir Dam is located in Harrisville, New Hampshire, a small rural town, which is predominantly agricultural with some residential areas, and a scattered population. It had a 1980 population of 890 persons according to U.S. Census Bureau data. This is an increase of about 47% over the 1970 population. Also, downstream from the dam, are the rural communities of Chesham (a small village in Harrisville) and Marlborough. Marlborough had a 1980 population of 1,846 persons (approximately an eleven percent increase over that of 1970). It's economy is supported by commercial development, especially along Route 101 and the Minnewawa Brook.

6. DESCRIPTION OF INUNDATED AREAS

a. REFERENCES. The inundation map for emergency action plan (Plates 2 and 3) is developed from the March 1986 Howe Reservoir Dam Dam-Break Analysis, using an enlargement of the 15 minute (1:62500) Monadnock Quadrangle map as revised, by the USGS, in 1949.

b. DESCRIPTION OF IMPACTED AREA. Howe Reservoir is located in Dublin, New Hampshire, a small town with a 1980 population of 1458. The dam is in Harrisville, about one mile upstream of Chesham, New Hampshire, and eight miles east of Keene, New Hampshire. The area downstream of the dam is wooded and steep. There are about a dozen houses and trailers in the immediate vicinity of Russell Reservoir. There is one bridge on Old South Street, in the inundation area, another bridge on Old Harrisville Road, in Chesham. There are eleven bridges in Marlborough, three on Roxbury Road, and eight along Route 101. There is a concentrated area in Marlborough at the town center, with a dozen stores and shops, the town office, fire department, a school, and about 50 homes.



MAP BASED UPON U.S.G.S.
MONADNOCK N.H. QUADRANGLE
1949 SCALE IN MILES

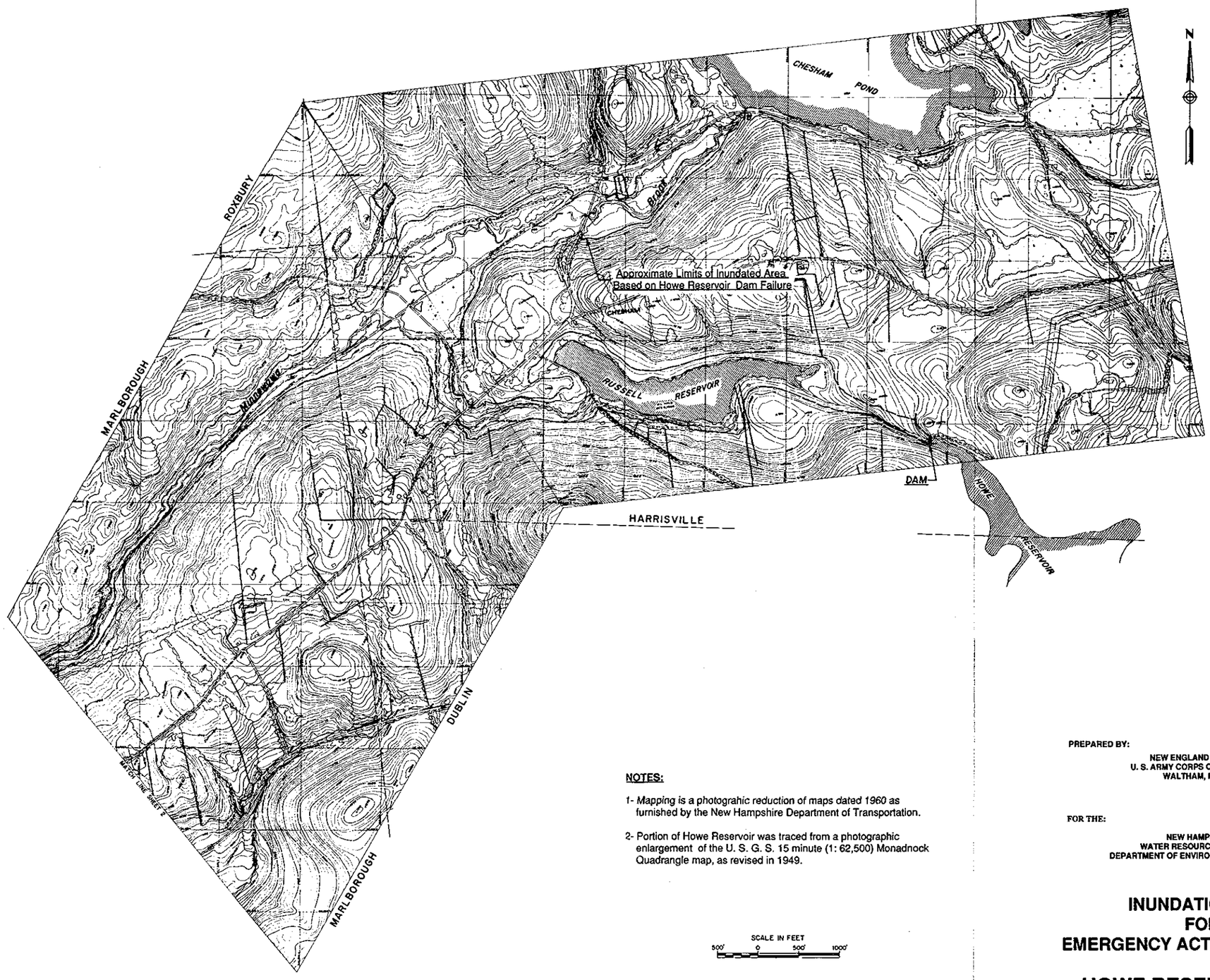
1MI. 0 1MI.

HOWE RESERVOIR DAM
Dam Break Flood Delineations

Location Map

U.S. Army Corps of Engineers

Plate 1



NOTES:

1- *Mapping is a photograhic reduction of maps dated 1960 as furnished by the New Hampshire Department of Transportation.*

2- Portion of Howe Reservoir was traced from a photographic enlargement of the U. S. G. S. 15 minute (1: 62,500) Monadnock Quadrangle map, as revised in 1949.

SCALE IN FEET
500' 0 500' 1000'

PREPARED BY:

NEW ENGLAND DIVISION
U. S. ARMY CORPS OF ENGINEERS
WALTHAM, MASS.

FOR THE:

NEW HAMPSHIRE
WATER RESOURCES DIVISION
DEPARTMENT OF ENVIRONMENTAL SERVICES

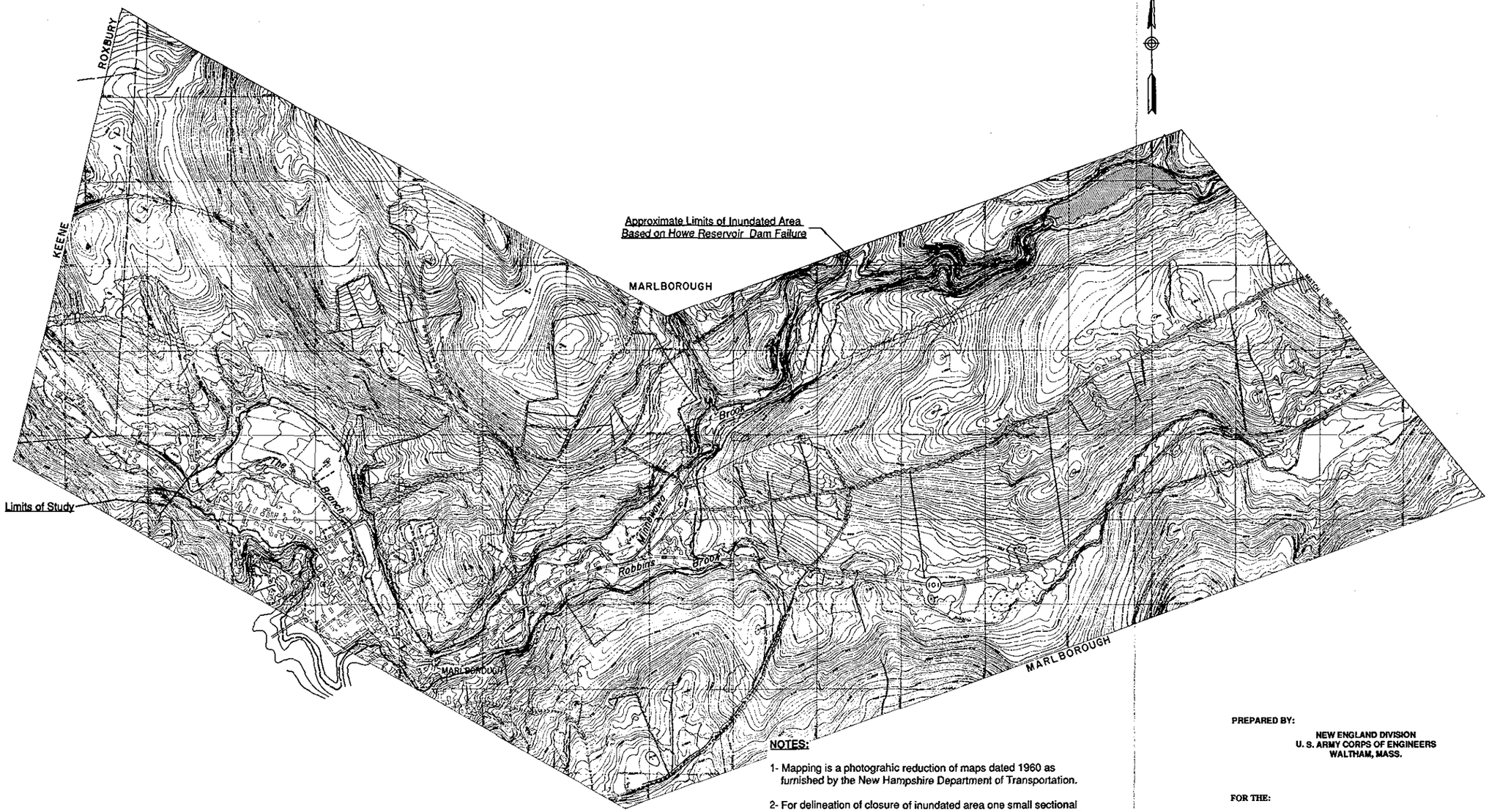
INUNDATION MAP FOR EMERGENCY ACTION PLAN (EAP)

HOWE RESERVOIR DAM
N. H. NO. 109.12

SHEET 1 OF 2

DEC. 1989

PLATE 2



NOTES:

1- Mapping is a photograhic reduction of maps dated 1960 as furnished by the New Hampshire Department of Transportation.

2- For delineation of closure of inundated area one small sectional area was traced from a photographic enlargement of the U. S. G. S. 15 minute (1: 62,500) Monadnock Quadrangle map, as revised in 1949.

SCALE IN FEET
500' 0 500' 1000'

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INUNDATION MAP FOR EMERGENCY ACTION PLAN (EAP)

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SHEET 2 OF 2 DEC. 1980

PLATE 3